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APPLICATION FOR LETTERS PATENT

**Full Scale Video with Overlaid Graphical User
Interface and Scaled Image**

Inventors:

David H. Sloo
Ronald Morris
Peter T. Barrett
Jeffrey Fassnacht

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1 **TECHNICAL FIELD**

2 This disclosure relates to interactive television systems, and particularly, to
3 user interfaces used in such systems.

4

5 **BACKGROUND**

6 Interactive television (ITV) is an evolving medium offering a user more
7 enriched viewing experiences in comparison to previous television broadcasting
8 mediums (i.e., radio frequency and cable television broadcasts). ITV makes use of
9 graphical user interfaces (GUIs) with interactive menus that provide valuable
10 information to users. Examples of such information include descriptions
11 regarding programs, the time in which particular programs are displayed, and
12 different variations such as languages in which a program may be viewed.

13 It is common for a user to invoke a GUI-based menu while watching a
14 video program. Unfortunately, the menu is often distracting to the user's ability to
15 continue watching the video program, as the user must mentally switch from
16 viewing the video images to focusing on the GUI. In some cases, the GUI
17 replaces the video program on the screen. Depicting the menu in place of the
18 video program completely interrupts the user's ability to continue watching the
19 video program, which typically continues to run in background.

20 In other cases, the GUI may be overlaid or displayed directly onto the video
21 images. In this situation, however, the overlaid GUI usually obscures the video
22 program, blocking out portions of the video images and thus interrupting the
23 user's ability to view the video program while the GUI is present. In still other
24 cases, the video images may be scaled to fit alongside a displayed GUI. However,
25 this technique typically involves resizing the video images to properly fit an

1 allocated section on the screen along with the GUI. In other words, a
2 predetermined format defines allocated sections on the screen for the user
3 interface and the video images when they are simultaneously displayed. Also,
4 when full scale video images are switched to scaled images, distortion may occur.
5 For example, the user may have chosen to view a movie in letterbox format, but
6 properly presenting the GUI with the scaled video images might require sizing the
7 video images to a format different than letterbox format, which distorts the video
8 images.

9 In the above described and other techniques, the video images are
10 interrupted, obscured, and/or distorted, affecting the user's viewing experience
11 when the GUI is called up. Although the user may desire to call up the graphical
12 user interface, the user may be hesitant to do so in order to avoid missing part of
13 the video program.

14

15 SUMMARY

16 The system and methods described herein provide a graphical user interface
17 (GUI) that minimizes distraction to the viewing experience of watching ongoing
18 programming while the GUI is present. For particular implementations, a full
19 scale image is displayed on a screen. A visually similar, but scaled image and a
20 GUI are overlaid on the full scale image. The scaled image and the GUI are
21 placed on the screen so that the GUI does not obscure vision of the scaled image.
22 In this manner, while the GUI obstructs viewing of the full scale image, it does not
23 obstruct viewing of the scaled image.

24 In certain implementations, a user may perform an action to format the
25 scaled image for better viewing without affecting the format of the full scale

1 image. Alternately, the scaled image may automatically be formatted for better
2 viewing without affecting the format of the full scale image. The user may also
3 initiate actions on the graphical user interface that changes or provides new
4 information displayed on the graphical user interface.

5

6 **BRIEF DESCRIPTION OF THE DRAWINGS**

7 Fig. 1 is a block diagram illustrating an exemplary system that supports
8 transmitting and receiving multiple video streams.

9 Fig. 2A illustrates an exemplary display screen in which a graphical user
10 interface and a scaled video image are overlaid onto a full scale video image
11 according to a first layout.

12 Fig. 2B illustrates another exemplary display screen with a second layout
13 that is different than the first layout depicted in Fig. 2A.

14 Fig. 3 is a block diagram illustrating an exemplary television server that
15 provides one or more video streams.

16 Fig. 4 is a block diagram illustrating an exemplary television client device
17 that receives one or more video streams.

18 Fig. 5 is a flowchart illustrating an exemplary process of providing video
19 streams of full scale and scaled images.

20 Fig. 6 is a flowchart illustrating an exemplary process of presenting a
21 graphical user interface on a screen.

22

23 **DETAILED DESCRIPTION**

24 The following disclosure concerns techniques for presenting a graphical
25 user interface (GUI) during play of video programs. The techniques will be

1 described in the exemplary context of television (e.g., cable TV, ITV, satellite TV,
2 etc), where a program menu or guide is invoked while video programs continue to
3 be displayed on screen.

4 In the described implementation, a GUI-based menu is overlaid atop a full
5 scale video image. A scaled version of the video image is also depicted
6 simultaneously with the menu and overlaid on the full scale video image. The
7 overlaid menu and scaled video image blocks portions of the full video scale
8 image; however, a user views an unobstructed and non-distorted scaled video
9 image similar in appearance to the full scale video image. The menu may be used
10 to display information related to broadcast programming and responsive to actions
11 initiated by the user.

12 Although there are many possible implementations, the techniques are
13 described in the context of an interactive TV environment, which is described first
14 in the next section.

15

16 Exemplary Environment

17 Fig. 1 shows an exemplary system 100 that provides identical video
18 streams. System 100 is a television entertainment system that facilitates
19 distribution of content and program data to multiple viewers. The system 100
20 includes a television server 105, and multiple client devices 110(1), 110(2) ...
21 110(N) coupled to the television server 105 via a distribution network 115.
22 Exemplary system 100 may include any number of television servers and client
23 devices. Although exemplary system 100 describes cable and/or satellite
24 transmission, it is contemplated that other modes of transmission, such as Internet
25

1 protocol television (IPTV), may be used to transfer video data from source (e.g.,
2 server) to destination (e.g., client).

3 Television server 105 serves various media content such as television
4 programs, movies, video-on-demand, and advertisements. The content may reside
5 at the television server 105 or be received from one or more different sources (not
6 shown). Further, television server 105 may provide other information to client
7 devices 110, such as electronic program guide (EPG) data for program titles,
8 ratings, characters, descriptions, genres, actor names, station identifiers, channel
9 identifiers, schedule information, and so on.

10 Television server 105 processes and transmits the media content over
11 distribution network 115. Distribution network 115 may include a cable television
12 network, RF, microwave, satellite, and/or data network such as the Internet, and
13 may also include wired or wireless media using any broadcast format or broadcast
14 protocol. Additionally, distribution network 115 can be any type of network, using
15 any type of network topology and any network communication protocol, and may
16 be represented or otherwise implemented as a combination of two or more
17 networks.

18 Client devices 110 may be implemented in a number of ways. A particular
19 client device 110 may be coupled to any number of televisions and/or similar
20 devices that may be implemented to display or otherwise render content.
21 Similarly, any number of client devices 110 may be coupled to a television.

22 For example, the client device 110(1) receives content including video
23 stream output 120 from a satellite-based transmitter via a satellite dish 125.
24 Content received by satellite dish 125 may be transmitted directly from television
25 server 105 or transmitted from distribution network 115. Client device 110(1) is

1 also referred to as a set-top box or a satellite receiving device. Client device
2 110(1) is coupled to a television 130 for presenting media content received by the
3 client device 110(1) (e.g., audio data and video data), as well as a graphical user
4 interface (GUI). Alternatively, radio frequency (RF) antennas may be used in
5 place of satellite dish 125 to receive content.

6 Client device 110(2) is coupled to receive content from distribution network
7 115 and provide the received content to a television 135. Client device 110(N) is
8 an example of a combination television 140 and integrated set-top box 145. In this
9 example, the various components and functionality of a set-top box are
10 incorporated into a television, rather than using two separate devices. The set-top
11 box incorporated into the television may receive content signals via a satellite dish
12 (similar to satellite dish 125) and/or connected directly to distribution network
13 115. In alternate implementations, client devices 110 may receive content signals
14 via the Internet or any other broadcast medium.

15 Television server 105 is configured to transmit a single video stream or two
16 video streams. The video stream(s) are shown as video stream 120. Video stream
17 120 may include video images from the media content provider. When two video
18 streams are transmitted, it is contemplated that one video stream is a compressed
19 version of the other (full scale) video stream. The compressed video stream makes
20 use of fewer transmission resources than the full scale video stream. In other
21 words, the compressed video stream makes use of less bandwidth resources when
22 broadcasted to client devices. The compressed video stream provides scaled video
23 images that are similar in appearance to the full scale video images of the full
24 scale video stream.

1 The scaled video images, along with a GUI, are overlaid onto full scale
2 images at client devices 110. Exemplary display layouts are shown as 150(1) on
3 television 130, 150(2) on television 135, and 150(3) on television 140. These
4 display layouts are described in more detail in the next section.

5

6 **User Interface**

7 Fig. 2A shows an exemplary screen 200 that may be presented on a
8 television screen, computer monitor, or other type of display implemented at the
9 client device 110. The screen display is similar to the display layouts 150 shown
10 in Fig. 1.

11 Screen display 200 includes a full scale image 205, a scaled image 210, and
12 a graphical user interface (GUI) 215. The full scale image 205 is representative of
13 a full scale video stream received at the client device 110. The full scale image
14 205 occupies the entire area of the screen. The scaled image 210 represents video
15 images of a scaled (and in certain cases compressed) video stream received at the
16 client device 110, which is an undistorted scaled version of the full scale video
17 stream represented by image 205. The scaled image 210 is visually similar to the
18 full scale image 205.

19 In this example, the scaled image 210 is placed in the lower left corner of
20 the screen 200. Alternatively, the scaled image 210 may be placed in other
21 sections of screen 200. Considering that most users are accustomed to viewing or
22 “reading” information from left to right and from top to bottom, information
23 and/or sub images (i.e., scaled image 200) may be laid out in order of importance
24 from top left to bottom right of screen 200. The layout may be changed to suit the
25 particular application of the GUI 215, the particular format of video as represented

1 by images 205 and/or 210, or a target audience
2 that reads text right-to-left might benefit from a different layout.

3 The GUI 215 is overlaid onto full scale image 205. GUI 215 may provide
4 various pieces of information presented in various layouts. GUI 215 is intended to
5 provide one example of a countless number of graphical interface menus. GUI
6 215 is placed alongside scaled image 210 in a manner that does not obscure the
7 scaled image 210. Both GUI 215 and scaled image 210 are overlaid onto and
8 partly obscure full scale image 205.

9 In this example, GUI 215 is a program guide 220 that includes a timeline
10 225, channel information beneath a “channels” heading 230, and movie
11 information beneath a “movies” heading 235. A user may select a particular entry
12 (i.e., movie) from the programming guide 220, and a summary 240 describing the
13 movie of interest is presented. The summary may include a critic and a censor
14 rating, along with a brief description of the movie. In this example, the user has
15 selected the movie “The Cow” on channel “106” as exhibited by the enlarged title
16 and channel number in the guide 220. The summary 240 presents information
17 about the movie “The Cow”.

18 Screen 205 comprises a set of graphical user interface arrows 245(1),
19 245(2), 245(3), and 245(4) to allow a user to navigate through the GUI 215. In
20 this example, arrows 245(1) and 245(2) allow a user to scroll through the channels
21 230; and arrows 245(3) and 245(4) allow the user to scroll through the timeline
22 225. Graphical user interface arrows 245 are configured to provide input from the
23 user back to either the television server 105 or client device 110 of Fig. 1, or to
24 another device and/or system, such as a “head in” defined as a TV operator’s
25 operation center, providing the graphical user interface 215.

1 While the menu 215 is present, the scaled video image 210 is presented
2 atop the full scale image 205 and both video images continue to display the
3 ongoing program. Since the full scale image 205 is similar image to scaled video
4 image 210, the user is able to watch the unobscured, reduced scaled image 210
5 while the menu 215 is present, thereby minimizing interruption to the ongoing
6 program. The user is able to make an easy and intuitive visual transition from full-
7 screen unobscured video to an interactive mode in which a reduced video
8 continues playing. The scaled video images continues to provide unobscured
9 video images, yet leaves screen 200 free for interactive user interface elements
10 (i.e., GUI 215).

11 Fig. 2B shows a screen 200 with an alternative exemplary display output.
12 Full scale image 205 continues to occupy the entire screen 200 as shown in Fig.
13 2A; however, in this example scaled image 210 has been moved. This illustrates
14 that scaled video image 210 is not limited to any particular portion of screen 200,
15 but may be placed anywhere on screen 200. Scaled image 210 may also be in a
16 different format than full scale image 205 in order to maximize user viewing. For
17 example, if full scale image 205 is in a letterbox format, scaled image 210 is
18 displayed in a format that may be better viewed by the user.

19 A different GUI 250 is presented to the user. In this particular example,
20 GUI 250 describes program information 255. The particular program information
21 relates to the movie “The Cow” which provides a summary 260 that includes the
22 title, censor rating, and a more detailed summary than presented in summary 240.
23 Further, GUI 250 provides interactive buttons for the use to choose from. In
24 particular, button 260 allows the user to go back to the guide, button 265 allows
25 the user to order the movie, and button 270 provides a preview of the movie.

1

2 **Television Server**

3 Fig. 3 shows an exemplary television server 105 that provides one or more
4 video streams to the client devices. Such video streams contain the full scale
5 image 205 and the scaled image 210 of Fig. 2A and Fig. 2B. Furthermore, the
6 television server 105 may broadcast GUI 215 of Fig. 2A and GUI 250 of Fig. 2B.
7 Television server 105 may be implemented as part of a larger server architecture
8 that provides a variety of television and Internet based services, where the larger
9 server architecture is part of a “head end”. Television server 105 may be
10 compatible with one of various standards including the Microsoft® Corporation’s
11 “TV Server” server.

12 Television server 105 includes a receiver component 305 which may be
13 configured as an input/output unit. Receiver component 305 receives media
14 content 310 that includes audio, video data, and GUI data (i.e., data related to full
15 scale image 205, scaled image 210, and GUIs 215, 250). Media content 310 may
16 be received from a media content provider or some other source.

17 A processor 315 is included in television server 105. The processor 315
18 may perform the functions of initializing/monitoring other components in
19 television server 105, processing various applications/programs, and fetching data
20 and instructions.

21 Television server 105 includes a storage/memory component 320
22 configured to store various applications/programs, an operating system, and
23 content such as media content 310. Storage/memory component 320 may include
24 random access memory (RAM) and read only memory (ROM). Furthermore,

1 storage/memory component 320 may be configured as an optical, magnetic or
2 some other read/write storage medium.

3 It is contemplated that media content 310 includes video content that
4 comprises a single video stream. Television server 105 includes a video splitter
5 component 325 that receives the single video stream and splits it into two video
6 streams.

7 One of the two video streams is received by a video compressor component
8 330. Video compressor component 330 may be configured to use a lossy
9 compression algorithm to reduce video images of the particular video stream that
10 is received. The lossy compression algorithm particularly drops quality
11 information from the video images such as eliminating some lines from the
12 compressed video. Since the compressed video images are displayed as a scaled
13 version of the uncompressed images at a client device, a user is not aware of any
14 degradation in video image quality from the compression: video images merely
15 appear smaller. A video stream of compressed images (compressed video stream)
16 is produced by video compressor component 330.

17 A synchronizer component 335 may be used to synchronize images of the
18 compressed video stream along with images of the uncompressed (full scale)
19 video stream. The synchronizer component 335 provides that the same images,
20 one scaled and the other full scale, are displayed at the same time. It is
21 contemplated that synchronizer component 335 may also synchronize audio
22 content and other media content (e.g., subtitle information) along with the images
23 of the compressed and full scale video streams. Separate media content streams
24 (i.e., distinct audio and video streams) may be sent from television server 105;
25 however, in particular embodiments, audio and video streams may be interleaved

1 with one another to create a single media stream that includes video and audio
2 content.

3 A video stream output component 340 is included in television server 105
4 to output compressed video stream 345 and a full scale video stream 350. The
5 images of either compressed video stream 345 and/or full scale video stream 350
6 may be altered (i.e., image format changed) without affecting the images of the
7 other video stream. For example, images of the compressed video stream 345 may
8 be transmitted in letter box format while images of the full scale video stream 350
9 may be transmitted in another format.

10 Video stream output component 340 may provide output directly to
11 broadcast network 115 of Fig. 1 or may output to other servers, devices, and sub-
12 networks within a head end prior to broadcast to client devices. In certain
13 embodiments, a single video stream is outputted from the video stream output
14 component 340, instead of the two video streams 345 and 350. As discussed
15 further below, in the case of a single video stream, a receiving client device
16 receives and splits the single video stream into two video streams.

17

18 **Client Device**

19 Fig. 4 shows an exemplary client device 110 that receives the one or more
20 video streams served by the television server 105. In certain embodiments, the
21 client device 110 receives two video streams (i.e., video streams 345 and 350 of
22 Fig. 3). In other embodiments, the client device 110 receives a single video
23 stream. Client device 110 is configured to receive data content 400 that includes
24 the compressed video stream 345 and the full scale video stream 350 of Fig. 3, or a
25 single video stream. When two video streams are received, one stream will

1 contain full scale video images that represent full scale image 205, and the other
2 video stream will contain scaled video images that represent scaled image 210 of
3 Fig. 2A and Fig. 2B. Furthermore, client device 110 may be configured to receive
4 GUI data that represents GUI 215 of Fig. 2A and GUI 250 of Fig. 2B.

5 A tuner 405 receives signals representing the data content 400. Tuner 405
6 may comprise a broadcast in-band tuner (not shown) configured to receive signals
7 from a particular channel; an out-of-bound tuner (not shown) configured to
8 facilitate the transfer of data from a head end to the client device 110; and a return
9 path tuner (not shown) configured to send data from the client device 110.

10 A demodulator/modulator component 410 of client device 105 converts
11 analog signals from tuner 405 to digital bit streams. The analog signals and the
12 digital bit streams include video streams. The digital bit streams are received at a
13 demultiplexer component 415. The digital bit streams comprise a number of
14 uniquely identified data packets that include a packet identifier (PID) which
15 identifies a particular format of data including video and audio data.

16 The demultiplexer component 415 examines the PID and forwards a data
17 packet associated with the PID to a specific decoder. In particular cases, a data
18 packet containing video data is sent to a video decoder/data decoder component
19 420. The video data represents the single stream of video or the compressed video
20 stream 345 and full scale video stream 350 of Fig. 3. In the case when two video
21 streams (compressed and full scale) are received by client device 110, the video
22 decoder/data decoder component 420 transforms the data packet containing the
23 video data into a sequence of scaled and full scale images which are sent over a
24 system bus 425. The system bus 425 in turn sends the images to a TV & Video
25 Output 430 which is connected to a monitor or a television.

1 In a particular embodiment, when a single video stream is sent to client
2 device 110, the data packet containing the video data is transformed into a
3 sequence of images which are sent to a video stream splitter/compressor
4 component 435 which creates scaled images and full scale images. The scaled
5 images may or may not be compressed by the video stream splitter/compressor
6 component 435. It is contemplated that other embodiments may place the video
7 stream splitter/compressor 435 or similar component at different locations within
8 the data processing components described above. For example, the digital bit
9 stream may be split before received by demodulator/modulator component 410; or
10 the data packet containing video data may be split before received by the video
11 decoder/data decoder component 415.

12 Processor component 440 is configured to communicate over the system
13 bus 425, and performs functions that include initializing various client device 110
14 components, processing various applications, monitoring hardware within client
15 device 110, and fetching data and instructions from a memory component 445.
16 Processor component 440 may also perform the function of synchronizing full
17 scaled and scaled video images.

18 Memory component 445 may comprise RAM used to temporarily store data
19 that is processed between processor component 440 and various hardware
20 components as described above. Memory component 445 may also include ROM
21 to store instructions. Further, memory component 445 may include read/write
22 storage devices such as hard disks and removable medium.

23 User interface or graphical interface menu data may be sent to client device
24 110 as part of data content 400. Tuner 405 receives the graphical interface menu
25 data that is part of data content 400. Demodulator/modulator component 410,

1 demultiplexer component 415 and video decoder/data decoder 420 may process
2 the graphical interface menu data. In certain embodiments components that
3 provide similar functionality may be used to process the graphical interface menu
4 data. Processed graphical interface menu data is sent to a graphics processor
5 component 450 which renders a graphical interface menu (graphical user
6 interface) to be overlaid onto video images. The graphical interface menu is sent
7 to system bus 425 which in turn sends the graphical interface menu to TV &
8 Video Output 430 which is connected to a monitor or television such as televisions
9 130, 135, and 140 of Fig. 1. The monitor or television provides a screen that
10 displays video images with an overlaid scaled video image and the overlaid
11 graphical interface menu. Graphical interface menu data may also be generated
12 entirely within the client device 110, and not sent as part of the data content 400.

13

14 **Operation**

15 Fig. 5 shows an exemplary process 500 of providing video streams that
16 may be used in an output display that provides a full scale image overlaid with a
17 visually similar, but scaled image and GUI, such as a program guide or other
18 menu. Process 500 may be incorporated at television server 105 of Fig. 2 or client
19 device 110 of Fig. 3. It is contemplated that the blocks described below of process
20 500 may be operations that are implemented in hardware, software, and/or a
21 combination.

22 At block 505, a video stream is received and split into two identical video
23 streams. This may be done through an analog RF splitter, or digital information
24 related to images of the received video stream may be copied from the original
25 video stream and creating a duplicate video stream. The video splitting may be

1 performed by the video splitter component 225 of television server 105 shown in
2 Fig. 2, or the video stream splitter/compressor 335 of client device 110 as shown
3 in Fig. 3.

4 At block 510, one of the video streams is compressed. As described above,
5 the compressed video stream represents the scaled image 210 displayed on screen
6 200 of Figs. 2A and 2B. This compression may be performed using one of various
7 lossy compression techniques by the video compressor 330 of television server
8 105 as shown in Fig. 3, or the video stream splitter/compressor 435 of client
9 device 110 as shown in Fig. 4.

10 At block 515, a determination is made whether the two video streams are to
11 be synchronized. When block 505 or block 510 occurs, or some other process
12 involving one and/or both of the video streams, one stream may be delayed
13 relative to the other. The determination process of block 515 may be performed
14 by processor component 315 of television server 105 shown in Fig. 3, or processor
15 component 440 of client device 110 shown in Fig. 4.

16 At block 520, if the streams need not be synchronized (i.e., the “No” branch
17 from block 515), the video streams are output. This operation may be performed
18 as an output function of television server 105 of Fig. 3, and particularly by video
19 stream output component 340 of television server 105. Block 520 may also be
20 performed as a function of client device 110 of Fig. 4 where the video streams are
21 output to system bus 425 and out to TV & Video Output 430 of Fig. 4.

22 At block 525, if the streams need to be synchronized (i.e., following the
23 “Yes” branch of block 515) the video streams are synchronized in order for the
24 same images to be streamed and presented with one another. At block 525 may be
25 performed by synchronizer 335 of television server 105 as shown in Fig. 3,

1 processor component 440 of Fig. 4 as described above. The synchronized video
2 streams are then output by block 520.

3 With the two video streams, one having scaled images and the other having
4 full scale images, a user is able manipulate images of one stream independent of
5 manipulating the images of the other stream. In other words, as described above
6 and shown in Figs. 2A and 2B, a user may modify the scale image 210 to a format
7 that provides better user viewing without modifying full scale image 205.

8 Fig. 6 shows an exemplary process 600 of displaying a graphical user
9 interface (GUI) using the video streams of process 500 of Fig. 5. In particular the
10 GUI and scaled images are overlaid onto full scale images. Process 600 may be
11 particularly implemented for screen 400 as shown in Fig. 4.

12 At block 605, a provision is made for display of a full scale image which is
13 part of a full scale video stream as described above. The full scale video image
14 occupies the entire screen or display as illustrated by full scale image 205
15 described above in Figs. 2A and 2B.

16 At block 610 a scaled video is displayed or overlaid onto a scaled video
17 image on top of the full scale video image. The scaled video image and the full
18 scale video image are similar in appearance. The scaled video image is illustrated
19 as scaled image 210 of Figs. 2A and 2B above. The scaled video image may be
20 placed in any location on the full scale image. Placement may be predicated on
21 accommodating the user, ease of viewing, and user choice.

22 At block 615 a GUI is placed (overlaid) onto the full scale video image
23 obscuring the full scale video image, but not obscuring the scaled video image.
24 The GUI is illustrated as GUI 215 of Fig. 2A and GUI 250 of Fig. 2B.

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1 At block 620 a user may perform an action, such as menu selection, on the
2 GUI. Actions may include choosing a menu item, scrolling through items
3 provided in the GUI, and calling up menus and/or other interfaces.

4 At block 625 action or actions of block 620 may be performed such as
5 instructing a device such as television server 105 of Fig. 3 or client device 110 of
6 Fig. 4 to provide new (e.g., modified) information to the GUI.

7 Although the invention has been described in language specific to structural
8 features and/or methodological acts, it is to be understood that the invention
9 defined in the appended claims is not necessarily limited to the specific features or
10 acts described. Rather, the specific features and acts are disclosed as exemplary
11 forms of implementing the claimed invention.

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